AIR FORCE

QUALIFICATION TRAINING PACKAGE (AFQTP)

for

ELECTRICAL SYSTEMS

(3E0X1)

MODULE 9

AF OCCUPATIONAL SAFETY AND HEALTH (AFOSH) PROGRAM

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Career Field Education and Training Plan (CFETP) references from 1 Apr 97 version.

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AIR FORCE QUALIFICATION TRAINING PACKAGES (AFQTPs)
For
ELECTRICAL SYSTEMS
(3E0X1)

INTRODUCTION

Before starting this AFQTP, refer to and read the "Trainee/Trainer Guide" located on the AFCESA Web site **http://www.afcesa.af.mil/.** This guide will be found at each AFS's AFQTP download page.

AFQTPs are mandatory and must be completed to fulfill task knowledge requirements on core and diamond tasks for upgrade training. ***It is important for the trainer and trainee to understand*** that an AFQTP ***does not*** replace hands-on training, nor will completion of an AFQTP meet the requirement for core task certification. AFQTPs will be used in conjunction with applicable technical references and hands-on training.

AFQTPs and Certification and Testing (CerTest) must be used as minimum upgrade requirements for Diamond tasks.

MANDATORY minimum upgrade requirements:

Core task:
AFQTP completion
Hands-on certification

Diamond task:
AFQTP completion
CerTest completion (80% minimum to pass)

Note: *Trainees will receive hands-on certification training when equipment becomes available either at home station or at a TDY location.*

Put this package to use. Subject matter experts, under the direction and guidance of HQ AFCESA/CEOT, revised this AFQTP. If you have any recommendations for improving this document, please contact the Electrical Systems Career Field Manager at the address below.

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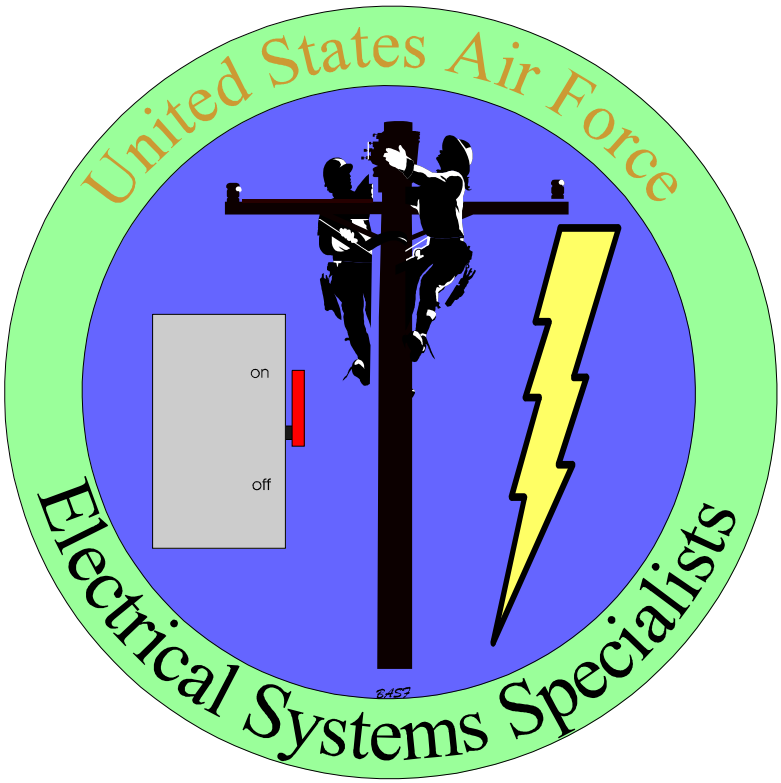


ELECTRICAL FACILITIES SAFE CLEARANCE FORMS

MODULE 9 **AFQTP UNIT 6**

INTERPRET AF FORM 269 WHEN PERFORMING SWITCHING (9.6.3.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

INTERPRET AF FORM 269 WHEN PERFORMING SWITCHING

Task Training Guide

STS Reference Number/Title:	9.6.3 Interpret AF Form 269 when performing switching
Training References:	• CDC 3E051A Vol. 1 • AFI 32-1064
Prerequisites:	• Possess as a minimum a 3E031 AFSC.
Equipment/Tools Required:	• AF Form 269
Learning Objective:	• Interpret AF Form 269 Electrical Facilities Safe Clearance
Samples of Behavior:	• Understand how to interpret AF Form 269,Electrical Facilities Safe Clearance, and follow the procedures exactly • Know safety requirements associated with interpreting AF form 269, Electrical facilities Safe Clearance
Notes:	
• Any safety violation is an automatic failure.	

INTERPRET AF FORM 269 WHEN PERFORMING SWITCHING

Background: Other than taking voltage and current measurements, whenever a distribution system must be worked on, it must be done under an Electrical Facilities Safe Clearance (AF Form 269). The safe clearance establishes a set of procedures that must be followed to turn the power off. The Base Civil Engineering Operations Flight Chief is responsible for safe clearance procedures. Following these procedures will let you work on lines and equipment in a safe manner. The AF Form 269 is used to record all switching, blocking, tagging, and grounding actions. It is very important that everyone understands how to read the form and follow the procedures exactly.

The following information will be annotated on the AF Form 269 prior to performing switching.

Block 1: Record number.

- A consecutive number, taken from the records maintained by the electrical safe clearance manager or chief of operations. It is used to keep track of the exact number and sequence of clearances issued. (See Figure 1)

Block 2: Other clearance numbers.

- Enter the next consecutive clearance number here if more than one safe clearance is to be issued on the same line or equipment. More than one clearance may be issued depending on the size of the job and the distance between the crews. In such cases, the electrical supervisor must coordinate on all safe clearances issued. (See Figure 1)

Block 3: Issued by.

- The electrical safe clearance manager must issue a safe clearance. Only one person can issue a clearance for a job. This eliminates confusion and possible hazardous conditions resulting from uncoordinated switching. (See Figure 1)

Block 4: Time Clearance was issued. (See Figure 1)

Block 5: Date Clearance was issued. (See Figure 1)

Block 6: Name of employee receiving clearance.

- Only one authorized person can receive the safe clearance. He or She is responsible for accomplishing the safe clearance procedures. (See Figure 1)

Block 7:Line/equipment involved.

- To let everyone know exactly which lines or equipment is affected, enter a brief but concise description of the lines or equipment on which the work is to be done. (See Figure 1)

Block 8:Details of blocking and tagging.

- This block contains the exact directions for all switching, blocking, tagging and grounding to be accomplished in the proper sequence. These steps must be followed exactly in sequence. This includes all switching, blocking, tagging, and grounding

operations. The person who receives the clearance controls the padlocks used for blocking. (See Figure 1)

Block 9: Time applied.

- Each time a detail action of switching, tagging, blocking, or grounding is done, the person who received the safe clearance must write the actual time opposite the detail and progress downward. This keeps track of the detail completed and the time accomplished. (See Figure 1)

Block 10: Released by.

- After work has been completed; the electrical supervisor releases the safe clearance to the safe clearance manager. It is the electrical supervisors responsibility to make sure that all personnel and temporary grounds are clear and all lines and equipment are ready for service. The signature of the electrical supervisor in the "Released By" block is certification that this has been done. (See Figure 1)

Block 11: Accepted by.

- The signature of the safe clearance manager certifies acceptance. This is a double check to make sure that all personnel are clear of the lines and ground sets have been removed. (See Figure 1)

Block 12: Time Released to Safe Clearance Manager. (See Figure 1)

Block 13: Date Released to Safe Clearance Manager. (See Figure 1)

Block 14: Time removed.

- Performing the switching operations in the reverse order is the responsibility of the electrical supervisor. Starting with the last detail and progressing upward on the AF Form 269, do each detail in reverse and annotate the actual time until the system is back to normal. Following the 269 in exact reverse order insures that no steps are overlooked and power is completely restored. (See Figure 1)

SAFETY: You must strictly adhere to these procedures. Your life or your buddy's life may depend on it!

ELECTRICAL FACILITIES SAFE CLEARANCE	RECORD NO. Block 1	OTHER CLEARANCE NOS. Block 2	
ISSUED BY (Name of installations electrical supervisor) Block 3		TIME Block 4	DATE Block 5
NAME OF EMPLOYEE RECEIVING CLEARANCE Block 6			
LINE/EQUIPMENT INVOLVED Block 7			

TIME APPLIED	DETAILS OF BLOCKING AND TAGGING	TIME REMOVED
Block 9	Block 8	Block 14
Block 9	Block 8	Block 14

RELEASED BY	ACCEPTED BY	TIME RELEASED	DATE RELEASED
Block 10	Block 11	Block 12	Block 13

AF FORM SEP 67 269

Figure 1, Air Force Form 269, Electrical Facilities Safe Clearance

To perform the task, follow these steps:

Step1: Insure AF Form 269 is filled out with appropriate information.

Step 2: Perform all details of blocking and tagging

a. Exactly as described
b. Following proper sequence (from top to bottom).

Step 3: Annotate "Time Applied" in left column as tasks are performed.

Step 4: Return AF Form 269 to electrical supervisor after work has been accomplished.

a. Electrical supervisor signs "Released By", "Time Released" and "Date Released".
b. Safe clearance manager signs "Accepted By"

Step 5: To re-energize, Perform details of blocking and tagging in exact reverse order (bottom to top).

Step 6: Annotate time removed in right column as tasks are performed.

Step 7: Return AF Form 269 to safe clearance manager

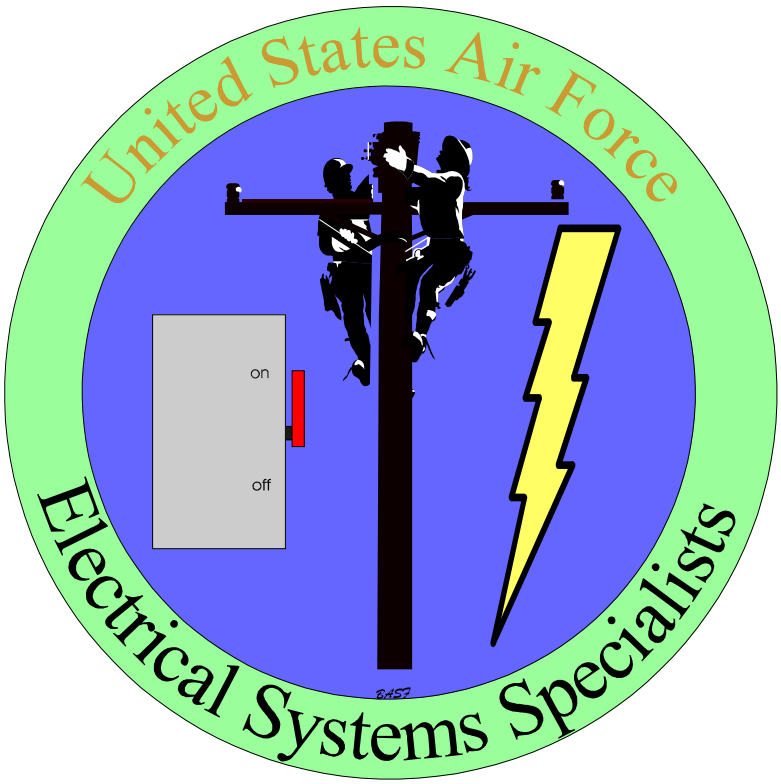
Review Questions
for
Interpret AF Form 269 When Performing Switching

Question	Answer
1. Who is responsible for initiating Safe Clearance Procedures?	a. Electrical Supervisor b. Craftsman c. Safe clearance manager d. Base Civil Engineering Operations Chief
2. AF Form 269 Electrical Facilities Safe Clearance must be used when working on any electrical equipment.	a. True b. False
3. Who signs the "Released By" block?	a. Base Civil Engineering Operations Chief b. Electrical Supervisor c. Superintendent d. Craftsman
4. Who performs the actual switching?	a. Work Leader b. Electrical Foreman c. Person receiving clearance d. Chief of Operations e.
5. To re-energize, perform details of blocking and tagging in reverse order.	a. True b. False
6. The AF Form 269 is a general outline used to accomplish high voltage switching.	a. True b. False
7. What time(s) are written on AF Form 269?	a. Time applied b. Time removed c. Time issued d. a & b e. a & c f. a, b, & c

INTERPRET AF FORM 269 WHEN PERFORMING SWITCHING

Performance Checklist		
Step	**Yes**	**No**
1. Did Trainee review AF Form 269 with Electrical Foreman?		
2. Did trainee follow the AF Form 269 when switching?		
3. Did trainee annotate "Time Applied"?		
4. Did trainee insure proper signatures after work was accomplished? 5. Did trainee reverse tasks to re-energize circuit? 6. Did trainee annotate "Time Removed"?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



ELECTRICAL FACILITIES SAFE CLEARANCE FORMS

MODULE 9 **AFQTP UNIT 6**

PLAN AND INTERPRET SAFE CLEARANCE

(9.6.4.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

PLAN AND INTERPRET SAFE CLEARANCE

Task Training Guide

STS Reference Number/Title:	9.6.4 Plan and Interpret Safe Clearance
Training References:	• CDC 3E051A Vol. 1 • AFI 32-1064
Prerequisites:	• Possess as a minimum a 3E031 AFSC.
Equipment/Tools Required:	• AF Form 269 • AF Form 979 • AF Form 980 • Electrical Distribution Maps
Learning Objective:	• Plan and implement an AF Form 269 Electrical Facilities Safe Clearance • Appropriately complete and apply an AF Form 979 • Appropriately complete and apply an AF Form 980
Samples of Behavior:	• Following approved procedures, plan a power outage using an AF Form 269 • Follow the steps while using an AF Form 979 • Follow the steps while using an AF Form 980 • Know safety requirements associated with planning and completing proper forms for a power outage
Notes:	
• Any safety violation is an automatic failure.	

PLAN AND INTERPRET SAFE CLEARANCE

Background: Other than taking voltage and current measurements, whenever a distribution system must be worked on, it must be done under an Electrical Facilities Safe Clearance (AF Form 269). The safe clearance establishes a set of procedures that must be followed to turn the power off. The Base Civil Engineering Operations Chief is responsible for safe clearance procedures. Following these procedures will let you work on lines and equipment in a safe manner. The AF Form 269 is used to record all blocking and tagging actions done on primary electrical circuits on Air Force installations. This form is not used to document work on secondary lines or equipment. All logs, administrative records, and safe clearance forms must be retained for 1 year after release.

SAFETY: You must strictly adhere to these procedures. Your life or your buddy's life may depend on it!

To perform the task, follow these steps:

Step 1: Identify the affected area.

- There are many reasons why you may need to isolate a portion of your distribution system. It could be you are preparing to install larger transformers for a system upgrade, or maybe a car crashed into a pole and you need to replace that pole. Although the purposes may differ the steps you take to isolate the circuit are the same.

Step 2: Visual Inspection of System.

- Physically go out and inspect the area you will be working. Take note of any switches in the distribution system or any points of possible back feed, such as laterals and buildings with back-up generators.

Step 3: Base Distribution Map.

- Use your base distribution maps to aid in determining which switches must be opened or closed to allow the majority of the customers to continue enjoying uninterrupted power while you isolate the work site.

Step 4: Fill Out the AF Form 269. (See Figure 1)

- **Record Number.** A consecutive number, taken from the records maintained by the electrical foreman/chief of operations.

- **Other Clearance Numbers.** Enter the next consecutive clearance number here if more than one safe clearance is to be issued on the same line or equipment.

- **Issued By.** The safe clearance manager or a designated supervisor must issue a safe clearance. He or she must also make any necessary arrangements for interruption of service and must notify the off-base utility if the operation will affect its system.

- **Name of Employee Receiving Clearance.** The supervisor responsible for exterior electrical systems will receive the safe clearance. In the absence of the supervisor, the safe clearance is to be issued only to authorized personnel, maintained on a list by the Infrastructure element supervisor. More than one safe clearance may be issued when more than one crew is used, in such cases; the electrical supervisor must coordinate on all safe clearances issued.

- **Line / Equipment Involved.** Enter a brief but concise description of the lines or equipment on which the work is to be done. The safe clearance is issued ***after*** this information is entered.

- **Details of Blocking and Tagging.** List all blocking and tagging details. All details of the procedures must be recorded in this section in their proper sequence, reading down the form. This must include all switching, blocking, tagging, and grounding operations. The person who receives the clearance controls the padlock.

> **NOTE:**
> A visible line break must be present at all points of possible feed before work can be done under a safe clearance. If a visible line break is not practical when working on an underground system, an oil disconnect switch or subway switch may be used as long as it is blocked mechanically, locked, and the appropriated tag attached. On underground switches, open the switch first and then place elbows (if present) on the parking bushings to ensure an open circuit.

- **Time Applied.** Each time a detail action of switching, tagging, blocking, or grounding is done, the person who received the safe clearance must write the actual time opposite the detail and progress downward.

- **Released By.** After work has been completed, release the safe clearance to the safe clearance manager. You must ensure that all personnel and temporary grounds are clear and all lines and equipment are ready for service. Your signature in the "Released By" block is certification that this has been done.

- **Accepted By.** The safe clearance manager is responsible for the release of all safe clearances. If more than one safe clearance has been issued, he or she must make sure that all clearances have been accepted and released before the tags and locks are removed. The signature of the safe clearance manager certifies acceptance.

- **Time Released to Safe Clearance Manager.**

- **Date Released to Safe Clearance Manager.**

- **Time Removed.** Performing switching operations in the reverse order is the responsibility of the electrical supervisor. Starting with the last detail and progressing upward on the AF Form 269, do each detail in reverse and annotate the actual time until the system is back to normal.

Step 5: Fill out the AF Form 979.

- Transcribe appropriate information from AF Form 269 on to AF Form 979 and place on pad lock..This tag signifies an abnormal condition exists.

Step 6: Fill out the AF Form 980.

- Transcribe appropriate information from AF Form 269 on to AF Form 980 and place on pad lock. This tag signifies danger to personnel and /or equipment.

ELECTRICAL FACILITIES SAFE CLEARANCE	RECORD NO. Block 1	OTHER CLEARANCE NOS. Block 2	
ISSUED BY *(Name of installations electrical supervisor)* Block 3		TIME Block 4	DATE Block 5
NAME OF EMPLOYEE RECEIVING CLEARANCE Block 6			
LINE/EQUIPMENT INVOLVED Block 7			

TIME APPLIED	DETAILS OF BLOCKING AND TAGGING	TIME REMOVED
Block 9	Block 8	Block 14
Block 9	Block 8	Block 14

RELEASED BY	ACCEPTED BY	TIME RELEASED	DATE RELEASED
Block 10	Block 11	Block 12	Block 13

AF FORM SEP 67 269

Figure 1, Air Force Form 269, Electrical Facilities Safe Clearance

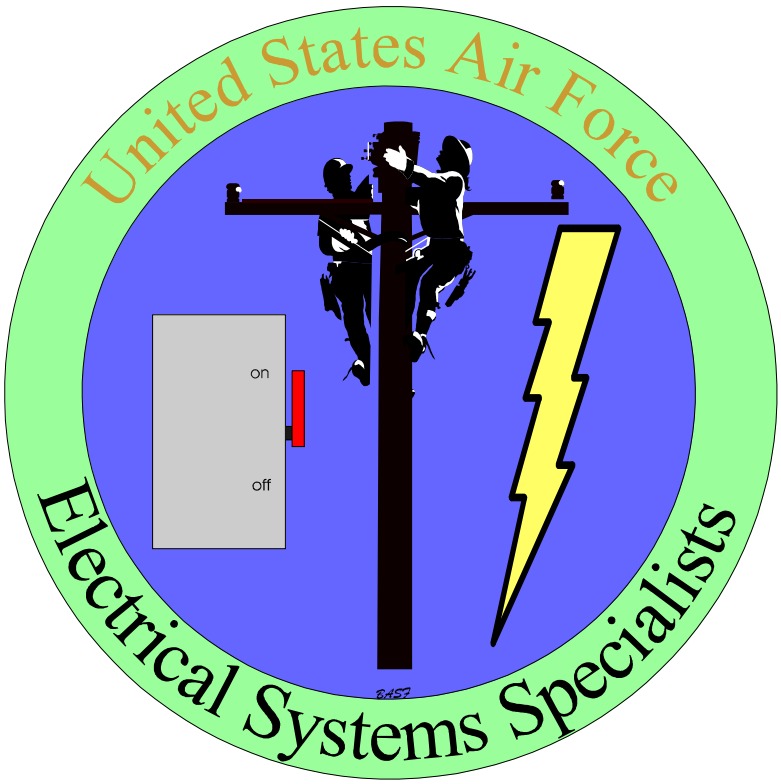
Review Questions
for
Plan and Interpret Safe Clearance

Question	Answer
1. What is the first step in planning an outage?	a. Determine area affected b. Isolate the system c. Install ground set d. Physically survey the area
2. Who may issue a safe clearance?	a. Designated Supervisor b. Electrical Superintendent c. Safe clearance manager d. A or C
3. Who is responsible for the release of all safe clearances?	a. Electrical Superintendent b. Chief of Operations c. Shop Foreman d. Safe clearance manager e. A or b
4. A visible line break must be present for work to be done under a safe clearance.	a. True b. False
5. What time is written on an AF Form 269?	a. Time Issued b. Time Released c. Time Applied d. All the above
6. The responsibility of reversing the switching procedures belongs to the Chief of Operations.	a. True b. False

PLAN AND INTERPRET SAFE CLEARANCE

Performance Checklist		
Step	**Yes**	**No**
1. Did trainee correctly determine the area to be affected by the outage?		
2. Did the trainee properly identify all switches and circuit breakers that needed to be blocked and tagged?		
3. Did the trainee write a brief but concise description of the lines or equipment on which the work is to be done?		
4. Did trainee correctly list details of all blocking and tagging?		
5. Were correct times recorded on the AF Form 269?		
6. Was the correct information recorded on AF Form 979?		
7. Was the correct information recorded on AF Form 980?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



MAINTENANCE OF DISTRIBUTION SYSTEM

MODULE 9 **AFQTP UNIT 11**

OVER 600 VOLTS

(9.11.1.1.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

OVER 600 VOLTS

Task Training Guide

STS Reference Number/Title:	9.11.1.1., AFOSH, Supervisor safety, and maintenance of distribution system over 600 volts
Training References:	• CDC- CDC 3E051A Vol. 1
Prerequisites:	• Possess as a minimum a 3E031 AFSC.
Equipment/Tools Required:	• Electrical Distribution maps • AF Form 269 • AF Form 979 • AF Form 980
Learning Objective:	• Safely plan power outages to accomplish distribution maintenance on systems over 600 volts.
Samples of Behavior:	• Following the steps, determine scope of outage, plan for notification of customers, time and duration of outage, assign work to crews and conduct safety briefing. • Know safety requirements associated with accomplishing maintenance on distribution systems
Notes:	
• Any safety violation is an automatic failure.	

OVER 600 VOLTS

Background: As a 5-level Electrical Systems specialist you are able to work on de-energized distribution systems over 600 volts. As a 7-level you must be able to safely get the distribution system to the point where your 5-level electricians can step in and complete the tasks. Then you must be able to reliably return the system to full operational status.

To complete the task, follow these steps:

Step 1: Determine the extent of the outage necessary.

- First determine the type of work that must be accomplished during the outage, pole change, insulator change, switchgear maintenance etc.
- Decide on how much of the system will need to be de-energized while you complete the work.
- Using the distribution system maps, determine how much switching and back feed capabilities you have available to minimize the impact on your customers.

Step 2: Determine material requirements.

- If material has been ordered by a planner, perform a material check and make sure that the material has been received and is the proper type and amount for your job.
- If no material has been ordered, physically visit the job site and make a list of material that you will need to accomplish the job.

Step 3: Plan Switching and back feed operations

- Write down all switching operations necessary to minimize customer outages and still provide safety to your job site.
- Accomplish any back feed and circuit tying operations prior to the scheduled outage time.
- Plan a day and time for your outage that will disrupt a minimum number of customers.
- If possible, notify customers a minimum of two weeks in advance for scheduled power outages.

NOTE:
Try to determine an accurate assessment of the duration of the outage then multiply your time by 1.5 and tell that to the customers. That will cover you in 90 percent of your unforeseen problems. It is better to err on the long side and get through early.

NOTE:
If it is an unplanned emergency outage, you will have to skip over step 2, and of course you cannot notify the customers. Every thing else still applies.

Step 4: AF Form 269 Electrical Facilities Safe Clearance.

- Using AF Form 269, write down all details of switching, blocking, tagging, and grounding.
- Give the completed 269 to the electrical foreman or superintendent for approval.
- After approval, fill out all AF Form (s) 979 and 980.

Step 5: Outage.

- Conduct a tailgate briefing and review work assignments for each crew so that each person understands exactly what his job is.
- Before the work begins on the outage, make sure that you give a comprehensive safety briefing to your work crew.

SAFETY:
TAKE SPECIAL CARE TO DISCUSS EACH STEP OF THE POWER OUTAGE IN A SAFE MANNER. WHEN WORKING WITH ELECTRICITY, SAFETY MUST BE A PRIME CONCERN.

- Notify the fire department which buildings will be affected so they will not run on false alarms.
- Go ahead with your outage following the procedures laid out in the AF Form 269.

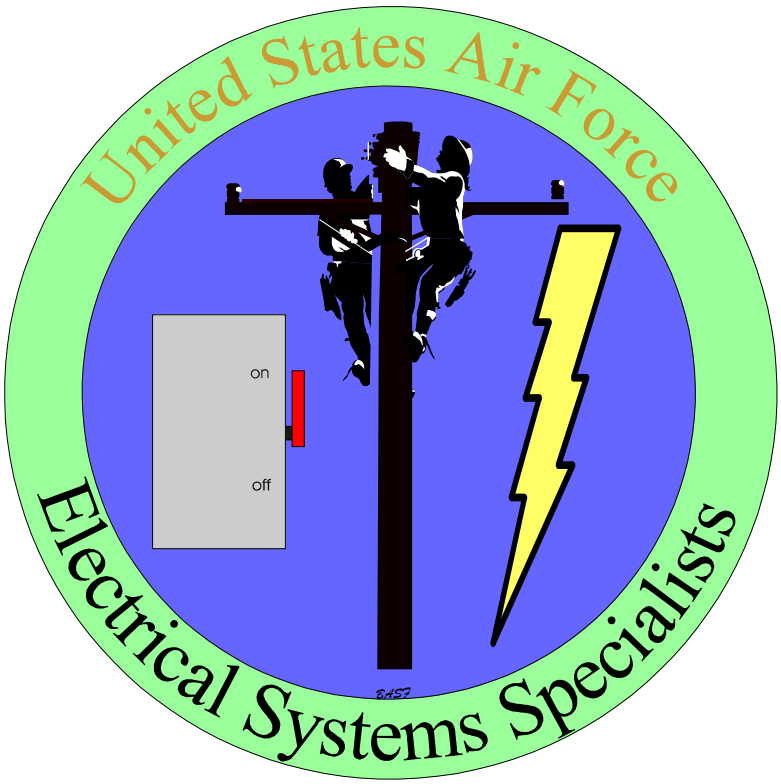
Review Questions
for
Over 600 Volts

Question	Answer
1. On what form do you list the specific steps of an outage?	a. AF Form 103 b. AF Form 269 c. AF Form 979 d. AF Form 980
2. What is the purpose of a "tailgate briefing"?	a. Determine extent of the outage b. Plan the outage c. Review work assignments d. Coffee Break
3. You should do a material check to make sure the planner really knows what he's doing.	a. True b. False
4. Why should you overestimate the outage time?	a. To inconvenience the customer to the maximum extent. b. To cover unforeseen problems c. So you can take a lunch break. d. To make your crew look really competent when you finish early.
	a.

OVER 600 VOLTS

Performance Checklist		
Step	**Yes**	**No**
1. Did the trainee correctly determine the extent of the outage?		
2. Did the trainee perform a material check?		
3. Did the trainee notify the customers in advance?		
4. Did the trainee correctly fill out AF Form 269?		
5. Did the trainee give a safety briefing?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



MAINTENANCE OF DISTRIBUTION SYSTEM

MODULE 9 **AFQTP UNIT 11**

UNDER 600 VOLTS

(9.11.1.2.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

UNDER 600 VOLTS

Task Training Guide

STS Reference Number/Title:	9.11.1.2- AFOSH, Supervisory safety, and maintenance of distribution system under 600 volts
Training References:	• CDC- CDC 3E051A Vol. 1
Prerequisites:	• Possess as a minimum a 3E031 AFSC.
Equipment/Tools Required:	• AF Form 979 • AF Form 980
Learning Objective:	• Safely plan power outages to accomplish distribution maintenance on systems under 600 volts.
Samples of Behavior:	• Following the steps, determine scope of outage, plan for notification of customers, time and duration of outage, assign work to crews and conduct safety briefing. • Know safety requirements associated with accomplishing maintenance on distribution systems
Notes:	
• Any safety violation is an automatic failure.	

UNDER 600 VOLTS

Background: As a 5-level Electrical Systems specialist you are able to work on de-energized distribution systems under 600 volts. As a 7-level you must be able to safely get the distribution system to the point where your 5-level electricians can step in and complete the tasks. Then you must be able to reliably return the system to full operational status.

To complete the task, follow these steps:

Step 1: Determine the extent of the outage necessary.

- First determine the type of work that must be accomplished during the outage, switch or outlet change, breaker maintenance etc.
- Decide on how much of the system will need to be de-energized while you complete the work.
- Using the building blueprints, determine how much switching and back feed capability you have available to minimize the impact on your customers.

Step 2: Determine material requirements.

- If material has been ordered by a planner, perform a material check and make sure that the material has been received and is the proper type and amount for your job.
- If no material has been ordered, physically visit the job site and make a list of material that you will need to accomplish the job.

Step 3: Plan Switching and back feed operations.

- Write down all switching operations necessary to minimize customer outages and still provide safety to your job site.
- Accomplish any back feed and circuit tying operations prior to the scheduled outage time.
- Plan a day and time for your outage that will disrupt the minimum number of customers.
- If possible, notify customers a minimum of two weeks in advance for scheduled power outages.

> **NOTE:**
> Try to determine an accurate assessment of the duration of the outage then multiply your time by 1.5 and tell that to the customers. That will cover you in 90 percent of your unforeseen problems. It is better to err on the long side and get through early.

NOTE:
If it is an unplanned emergency outage, you will have to skip over step 2, and of course you cannot notify the customers. Every thing else still applies.

Step 4: AF Form(s) 979 and 980.

- Using AF Form(s) 979 and 980 fill out the type of equipment involved.

Step 5: Outage.

- Conduct a tailgate briefing and review work assignments for each crew so that each person understands exactly what his job is.
- Before the work begins on the outage, make sure that you give a comprehensive safety briefing to your work crew.
- Notify the fire department if the fire alarm circuits will be affected so they will not run on false alarms.
- Make sure that each the crew leader has a lock-out tag-out kit and uses it to block switches and panels.

SAFETY:
TAKE SPECIAL CARE TO DISCUSS EACH STEP OF THE POWER OUTAGE.

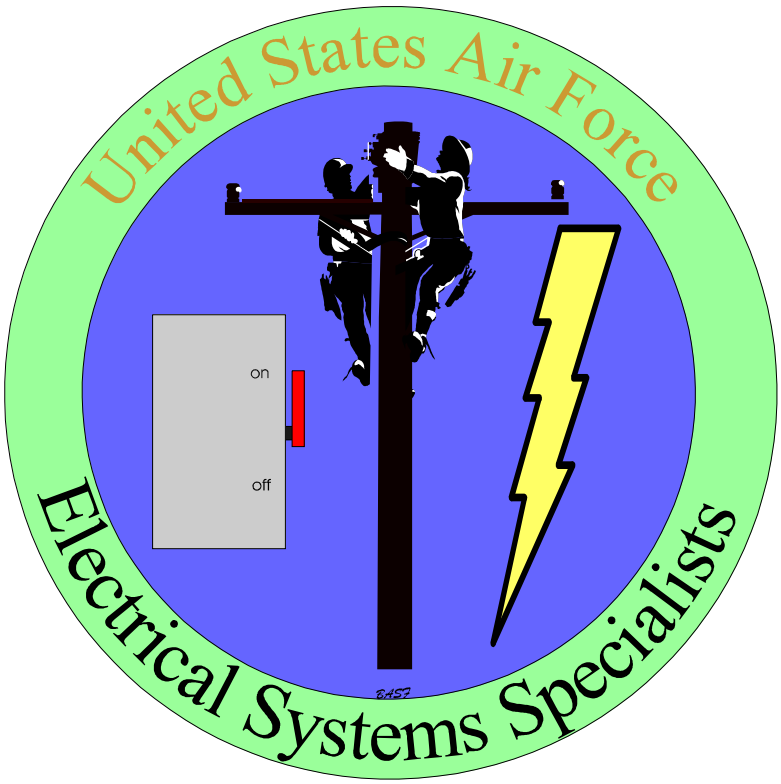
Review Questions
for
Under 600 Volts

Question	Answer
1. What is the purpose of a "tailgate briefing"?	a. Determine extent of the outage b. Plan the outage c. Review work assignments d. Coffee Break
2. You should do a material check to make sure the planner really knows what he's doing.	a. True b. False
3. Why should you overestimate the outage time?	a. To inconvenience the customer to the maximum extent. b. To cover unforeseen problems c. So you can take a lunch break. d. To make your crew look really competent when you finish early.
4. What is the purpose of lockout-tagout procedures?	a. Make equipment tamper-proof. b. Prevent accidental energizing of line. c. Protection of personnel. d. Protection of equipment. e. B and c.

UNDER 600 VOLTS

Performance Checklist		
Step	**Yes**	**No**
1. Did the trainee correctly determine the extent of the outage?		
2. Did the trainee determine material requirements and perform a material check?		
3. Did the trainee plan the switching and back feed procedures correctly?		
4. Did trainee fill out the correct forms?		
5. Did trainee give tailgate and safety briefings prior to job start?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



WORK ON ENERGIZED CIRCUITS

MODULE 9 **AFQTP UNIT 12**

OVER 600 VOLTS

(9.11.2.1.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

OVER 600 VOLTS

Task Training Guide

STS Reference Number/Title:	9.11.2.1- AFOSH, supervisory safety, and work on energized circuits over 600 volts
Training References:	• AFH 32-1011 • CDC 3E051B Vol. 1 Substation Equipment and Overhead Systems. • AFI 32-1064
Prerequisites:	• Possess as a minimum a 3E051 AFSC.
Equipment/Tools Required:	• AFH 32-1011 • AFI 32-1064
Learning Objective:	• Safely plan work on energized circuits over 600 volts
Samples of Behavior:	• Follow the required steps for proper supervision of work on energized circuits over 600 volts • Know safety requirements associated with accomplishing work on energized circuits
Notes:	
• Any safety violation is an automatic failure.	

OVER 600 VOLTS

Background: Safety procedures are a must in repairing energized overhead and underground distribution systems. Failure to observe any step could endanger the lives of you or the people you're working with and damage expensive equipment. Observe approved work methods, equipment pre-work procedures, and general job-in-progress procedures.

To accomplish the task, follow these steps:

Step 1: Authorization.

- Work on energized lines and equipment only when authorized by the Chief of the Operations Flight as necessary to support a critical mission, to prevent injury to persons, or to protect property.

Step 2: Determine number of qualified workers.

- OSHA regulation 29 CFR 1910.269 requires more than one qualified worker where the hazard exposure of the work is significantly reduced by the presence of additional workers.

- AFI 32-1064 requires a minimum of two electricians qualified for the voltage range (including other conductors within reach) must be available.

> NOTE:
> It is generally acceptable for one worker to take routine electrical measurements or perform switching using gloves and live line tools if the worker is positioned out of reach or possible contact with energized parts.

Step 3: Approved work methods by voltage class.

- **Up to 600 volts** – Gloving by conventional work position or by structure mounting.

- **600 volts to 7.5 kV** – Gloving from structure or in an aerial lift bucket.

- **7.6 to 15 kV** – Gloving from electrically insulated aerial lift bucket or platform, or the use of live line tools from structure or an aerial lift bucket (ground potential).

- **15.1 to 36 kV** – Gloving or the use of live line tools from an electrically insulated aerial lift bucket (intermediate potential).

Step 4: Safety briefing and job assignment.

- Give a thorough safety briefing covering all aspects of the job, including voltage level, safe working distance, protective equipment, and procedures.
- Assign workers specific tasks to perform and have them repeat the task back to you to ensure complete understanding of the job.
- Make sure that the protective equipment used is of the proper voltage rating.
- Work performed must be under the direct supervision of a qualified foreman or work leader devoting full time and attention to the workers and the safety of their work and warn the workers of any perceived dangers.

SAFETY:
EVEN IF ALL THE WORKERS ARE EXPERIENCED LINEMEN, A SAFETYMAN IS A MUST FOR PROPER PROCEDURE. EVERYONE GETS TIRED ON LONG JOBS AND EVEN THE BEST LINEMEN CAN OVERLOOK THINGS THAT ARE POTENTIALLY HAZARDOUS, THAT'S WHY WE CALL THEM ACCIDENTS.

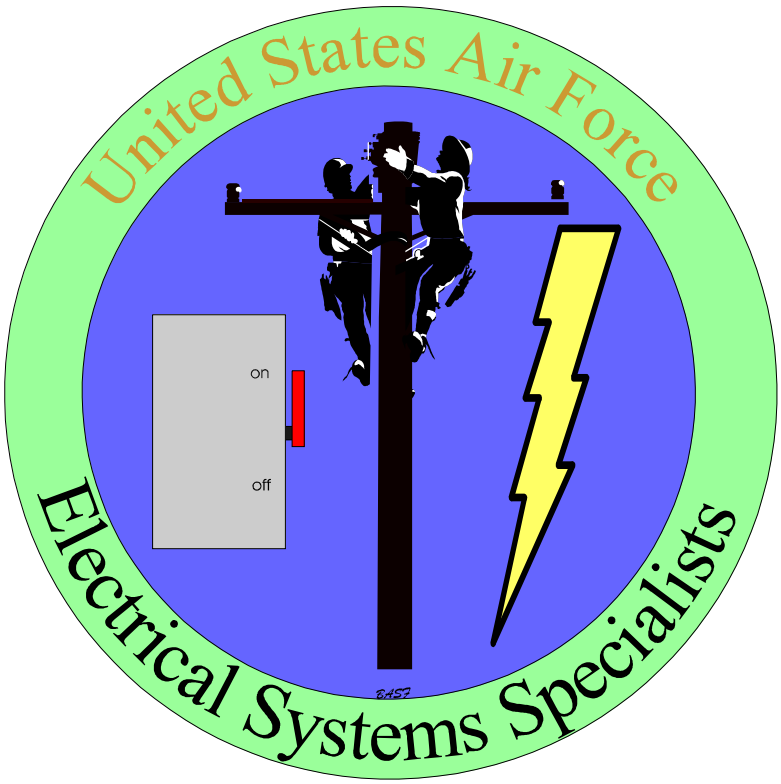
Review Questions
for
Over 600 Volts

Question	Answer
1. Work on energized lines and equipment is authorized by _____.	a. Base Civil Engineer. b. Operations Flight Commander. c. Designated Authority. d. Any of the Above.
2. Live line switching or routine electrical measurements are approved for one person provided he cannot contact energized parts.	a. True b. False
3. All live line work must be performed under the direct supervision of the foreman or work leader.	a. True b. False
4. A tailgate safety briefing is not required when all workers are qualified for the voltage level being worked.	a. True b. False

OVER 600 VOLTS

Performance Checklist		
Step	**Yes**	**No**
1. Did trainee receive proper authorization?		
2. Did trainee provide direct supervision of work?		
3. Did trainee inspect protective equipment for proper voltage rating?		
4. Did trainee give safety briefing?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



WORK ON ENERGIZED CIRCUITS

MODULE 9 **AFQTP UNIT 12**

UNDER 600 VOLTS

(9.11.2.2.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

UNDER 600 VOLTS

Task Training Guide

STS Reference Number/Title:	9.11.2.2-AFOSH, supervisory safety, and work on energized circuits under 600 volts
Training References:	• AFH 32-1011 • AFI 32-1064
Prerequisites:	• Possess as a minimum a 3E031 AFSC.
Equipment/Tools Required:	• AFH 32-1011 • AFI 32-1064
Learning Objective:	• Safely plan work on energized circuits under 600 volts
Samples of Behavior:	• Follow the required steps for proper supervision of work on energized circuits under 600 volts • Know safety requirements associated with accomplishing work on energized circuits
Notes:	
• Any safety violation is an automatic failure.	

UNDER 600 VOLTS

Background: Safety procedures are a must in repairing energized distribution systems. Failure to observe any step could endanger the lives of you or the people your working with and damage expensive equipment. Observe approved work methods, equipment pre-work procedures, and general job-in-progress procedures.

To accomplish the task, follow these steps:

Step 1: Authorization.

- Authorization is not required for work on low voltage control, power and lighting circuits while energized for the purposes of testing, calibrating, troubleshooting, performing minor repairs and replacing fuses and circuit breakers.

Step 2: Determine number of qualified workers.

- OSHA regulation 29 CFR 1910.269 requires more than one qualified worker where the hazard exposure of the work is significantly reduced by the presence of additional workers.

- AFI 32-1064 requires a safety observer when working on systems of 300 volts or more.

> NOTE:
> It is generally acceptable for one worker to take routine electrical measurements or operate metal enclosed switchgear with nominal voltages of 600 vac or less or 250 vdc or less.

Step 3: Approved work methods by voltage class.

- Avoid simultaneous contact with two energized conductors, or contact with one energized conductor and the grounded conductor or grounded objects.

Step 4: Safety briefing and job assignment

- Safety briefings are still an important part of any electrical work. Make sure you give a good one covering all aspects of the job and the hazards present while working with electricity.

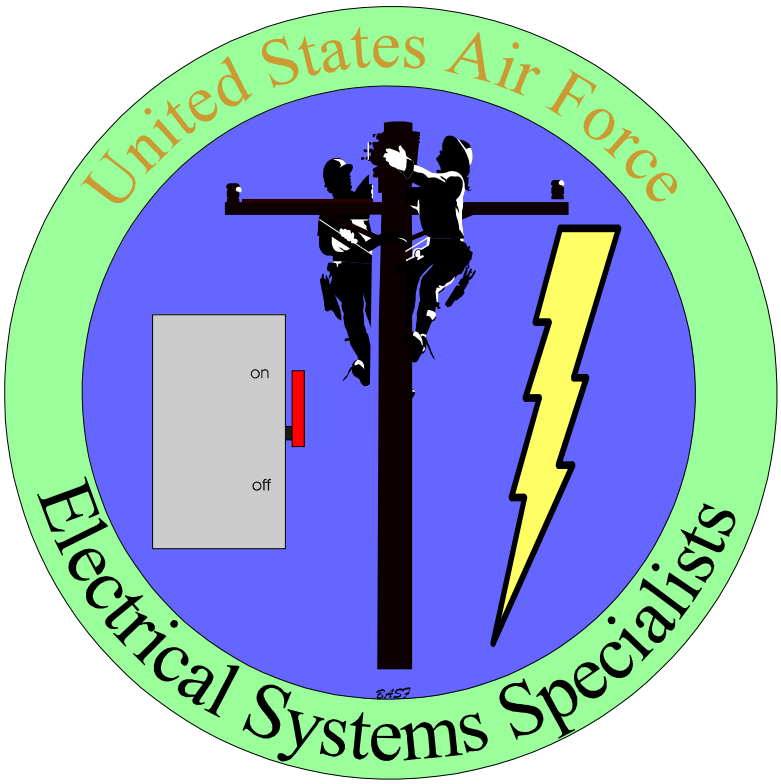
Review Questions
for
Under 600 Volts

Question	Answer
1. Two qualified electricians are necessary for any work on a 277/480-vac circuit.	a. True b. False
2. Authorization from the Operations Flight Commander is required for work on low voltage systems.	a. True b. False
3. According to AFI 32-1064 a safety observer must be present for voltages over ____volts.	a. 100 vac b. 200 vac c. 300 vac d. 400 vac
4. Safety briefings are not required on voltages below 300 volts.	a. True b. False

UNDER 600 VOLTS

Performance Checklist		
Step	**Yes**	**No**
1. Did the trainee request authorization?		
2. Did trainee determine voltage of system?		
3. Did trainee determine that live line work was required?		
4. Did trainee request a safety observer?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



CONDUCT SAFETY INSPECTIONS OF:

MODULE 9 **AFQTP UNIT 12**

HOTLINE TOOLS

(9.12.1.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

HOTLINE TOOLS

Task Training Guide

STS Reference Number/Title:	9.12.1.- AFOSH, conduct safety inspection of hotline tools
Training References:	• CDC 3E051B Vol. 1 Substation Equipment and Overhead Distribution Systems • AFH 32-1011 • AFI 32-1064
Prerequisites:	• Possess as a minimum a 3E031 AFSC.
Equipment/Tools Required:	• Hot line tools
Learning Objective:	• Conduct safety inspection of hotline tools
Samples of Behavior:	• Follow the required steps while inspecting hotline tools
Notes:	
• Any safety violation is an automatic failure.	

HOTLINE TOOLS

Background: The purpose of hot-line tools is to minimize the number of power interruptions or outages. The tools are used for maintenance, not for construction. Maintenance of energized, or "hot," high-voltage lines may appear hazardous, especially when you compare it with maintenance on de-energized or on low-voltage lines with rubber gloves and other rubber protective equipment. However, the work can be just as safe if linemen are always conscious of the fact that the lines are energized. If you remember this, you'll be cautious! When you work on live lines; there's no possibility of the line being hot when you thought it was dead, which is possible when you're working on *supposedly* dead lines. When you're working with energized lines, you know that each conductor is hot; each operation is planned and performed accordingly. Use only hot sticks with manufacturer's certification to withstand a minimum test of 100,000 volts AC per foot for 5 minutes on fiberglass and epoxy sticks. Hot-line tools are tested electrically upon receipt from the manufacturer and re-tested every 6 months. Hot-line tools stored for mobility are tested once a year. Also, the electrical supervisor inspects the tools visually in the field at least every 6 months to make sure they maintained properly. Epoxiglass hot-line tools are safe, dependable, and made to take demanding use.

To perform the task, follow these steps:

Step 1: Visual inspection.

- Long exposure to moisture, dirt, or ultraviolet attack can affect the tool adversely. Hot-line tools must be inspected before each use. Inspect the tool visually for cracked or distorted end fittings, feathered rivets or ferrules that have moved visibly, hairline cracks or scars in the insulation, and blisters in poorly applied coatings that could trap moisture.

- Inspect the fiberglass surface of each tool for dirt, creosote, grease, paint, or any other foreign material before and after each use. If you find any of these contaminants fiberglass surface must be cleaned.

NOTE:
Although wooden hot-line tools are still approved for use, efforts should be made to replace them with fiberglass tools.

Step 2: Clean fiberglass tools.

- Wipe the fiberglass with a clean rag.

- Clean the fiberglass surface with hot-stick pole cleaner **(CAUTION:** Do not use this cleaner on painted surfaces). This nonconductive cleaner will also remove surface wax on fiberglass. If this step is successful in cleaning the hot-stick, you **must** do the next procedure.

- Wax the fiberglass surfaces with hot-stick wax.

- If hot-stick pole cleaner fails to clean the fiberglass surface (this should be infrequent), take the tool out of use, tag it, and refer it to the supervisor for further evaluation. **(CAUTION:** Don't write on the fiberglass surface).

- Don't use household or industrial soap detergents, abrasives, and clean (liquid or powdered form) to clean fiberglass tools under field conditions. Cleaning agents leave conductive residue unless they're rinsed off with generous amounts of water (usually not available in the field). Abrasive cleaners destroy the surface gloss on the stick. All fiberglass tools that subjected to such cleaning agents must be tested electrically to ensure complete removal of residue from soap-type cleaners.

NOTE:
Silicone cloths may enhance the electrical integrity of hot sticks and help protect the glossy fiberglass surface, but they're not approved for use because silicone may migrate and over a period of time may hamper refinishing. Hot-stick wax has all of the advantages of silicone without the suspected adverse effects.

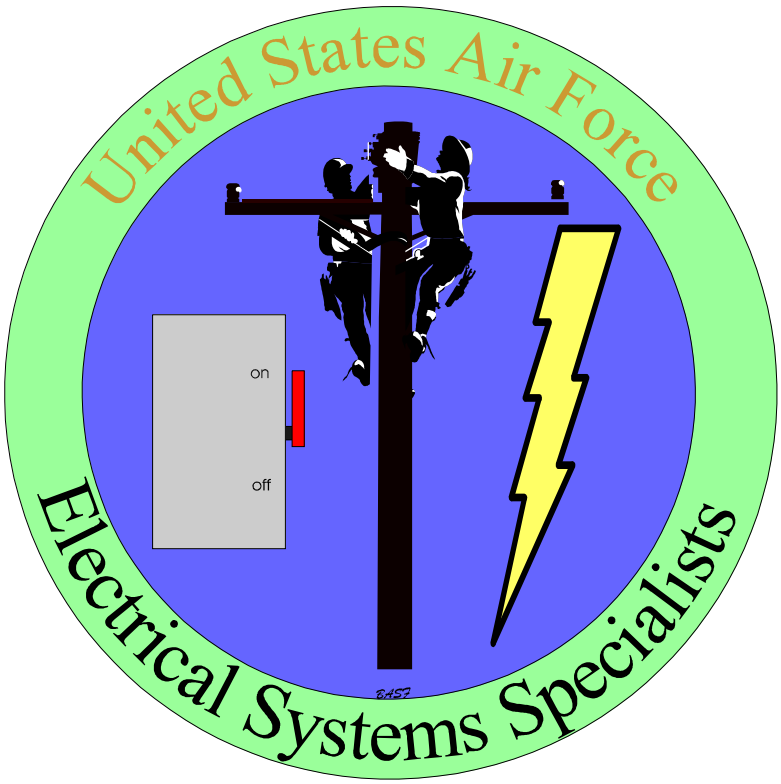
Review Questions
for
Hotline Tools

Question	Answer
1. What is the purpose of using hot-line tools?	a. Minimize power outages b. Line construction c. Disconnect Power
2. How often does the supervisor inspect hot-line tools visually?	a. Monthly b. Quarterly c. Semi-annually d. Annually
3. Silicone cloths should be used to maintain the finish on fiberglass hot-sticks.	a. True b. False
4. Hotline tools used for mobility are electrically tested at intervals not to exceed _____.	a. 3 months b. 6 months c. 9 months d. 12 months
5. What is the minimum acceptance voltage for fiberglass sticks?	a. 75kv AC for 3 minutes b. 100kv AC for 3 minutes c. 75kv AC for 5 minutes d. 100kv AC for 5 minutes
6. You may use household detergent to clean hot-sticks under field conditions.	a. True b. False

HOTLINE TOOLS

Performance Checklist		
Step	**Yes**	**No**
1. Did the trainee inspect the tool visually for cracked or distorted end fittings, feathered rivets or ferrules that have moved visibly, hairline cracks or scars in the insulation, and blisters in poorly applied coatings that could trap moisture?		
2. Did the trainee inspect the fiberglass surface of each tool for dirt, creosote, grease, paint, or any other foreign material before and after each use?		
3. Did the trainee clean the fiberglass surface of the tool with the correct cleaning agent?		
4. Did the trainee wipe down the fiberglass hot-stick with a silicone cloth?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



CONDUCT SAFETY INSPECTIONS OF:

MODULE 9 **AFQTP UNIT 12**

RUBBER PROTECTIVE EQUIPMENT

(9.12.2.)

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

RUBBER PROTECTIVE EQUIPMENT

Task Training Guide

STS Reference Number/Title:	9.12.2.- AFOSH, conduct safety inspections of rubber protective equipment
Training References:	• CDC 3E051 B Vol. 1- Substation Equipment and Overhead Systems • AFH 32-1011- Electrical Worker Field Safety Guide • ANSI/ASTM F 478 In-service care of insulating line hose and covers • ANSI/ASTM F 479-95 In-service care of insulating blankets • ANSI/ASTM F 496-97 In-service care of insulating gloves and sleeves
Prerequisites:	• Possess as a minimum a 3E031 AFSC.
Equipment/Tools Required:	• Rubber gloves • Rubber sleeves • Rubber Blankets • Line Hoses • Hoods
Learning Objective:	• Conduct safety inspection of rubber protective equipment.
Samples of Behavior:	• Follow the required steps while correctly inspecting rubber protective equipment for physical damage and chemical deterioration.
Notes:	
• Any safety violation is an automatic failure.	

RUBBER PROTECTIVE EQUIPMENT

Background: Electrician's rubber protective equipment is for personal protection, and serious personal injury may result if it fails in use. The American National Standards Institute/American Society for Testing Materials (ANSI/ASTM) specifications for in service care of rubber protective equipment stress visual inspection in the field as an important requirement in protecting from electric shock.

Rubber protective equipment (gloves, sleeves, blankets, line hoses and hoods) made of Type I natural or polyisoprene synthetic rubber is subject to ozone and corona deterioration.

Salcore equipment made of Type II elastomeric compounds is not affected by this particular deterioration.

All rubber protective equipment is subject to chemical deterioration and possible loss of insulating properties after prolonged exposure to ozone, heat, sun, oil and grease, or general weathering. In addition to regular electrical tests and visual inspection for physical defects such as holes, tears, punctures and cuts, it should also be visually inspected at regular intervals for signs of possible chemical deterioration such as corona cutting, ozone or sun checking. Check for texture changes such as swelling, softening, hardening and becoming sticky or inelastic.

If contact has been made with any petroleum-base products (such as inhibitors, hydraulic fluids, and transformer oils), the gloves and sleeves must be wiped off with a rag as soon after the contact as possible. Failure to remove the petroleum-based product promptly will result in the rubber's swelling and ultimately deteriorating. The swelling will eventually disappear, but it may cause considerable reduction of mechanical strength. The resistance to snag, puncture, and tear may be greatly reduced and chemical deterioration may result.

Because of potential loss of electrical resistance reversion or other deterioration, equipment should be withdrawn from service the first indication of chemical deterioration.

NOTE:
The in-service specifications require rubber gloves and sleeves to be electrically tested initially upon receipt from manufacturer and re-tested at least every 3 months for rubber gloves (shelf life 9 months) and 9 months for rubber sleeves. Additionally, a visual inspection of all rubber protective equipment should be made in the field by the electrical supervisor at intervals not to exceed 6 months to ensure that the users are keeping the equipment in satisfactory condition

To perform the task, follow these steps:

Step 1: Rubber Gloves.

- Electrician's rubber gloves must be carefully inspected before each use. Rubber gloves must be field air-tested before use each day, and more frequently if there is cause to suspect damage.
- Stretch the rubber and look for cracks, tears, and holes in the gloves especially around the parts of the glove that bend when your hands flex.
- Gloves must be inspected inside and out.
- To perform a field air test, hold the glove with the opening up and quickly roll the cuff trapping air inside the glove.
- Hold the glove close to your face, squeeze it and listen for air escaping and try to feel air on your cheek.

SAFETY:
ANY DAMAGED GLOVE IS TO BE REMOVED FROM SERVICE AND DESTROYED.

Step 2: Sleeve inspection.

- In inspecting sleeves, inspect the entire inner and outer surface for pinholes, cuts, scratches, abrasions, aging, corona cutting, oil markings, or other chemical injuries.
- Stretch or roll the rubber between your fingers or on a flat surface to reveal defects. If any of the above defects are found, the sleeve must be tagged with drawn from service.

Step 3: Blanket inspection.

- To locate swelling, scratches, tears, abrasions, snags, tracking cutting, or age cracking, roll the blankets twice on each side, with the second roll at a right angle the first roll.
- Blankets that show any of the flaws listed above must be removed from service, repaired and re-tested, or destroyed.

Step 4: Rubber insulating line hose, hoods, and covers

- Rubber insulating line hose, hoods, and covers must be inspected before each use.
- Inspect thoroughly for cuts, scratches, corona cutting, holes, tears and punctures, rope or wire burns, and aged rubber.

- Look for texture changes such as swelling, softening, hardening, becoming sticky or inelastic, which are signs of chemical deterioration.

- If the mechanical damage extends one-quarter of the wall thickness' the hose or hoods or if there is possible chemical deterioration, they must be removed from service and destroyed. There is no repair for line hoses and hoods.

NOTE:
In-service specifications for line hoses and hoods require electrical testing when there is reason to suspect the electrical integrity of a line hose or cover such as cuts, tears, cracks, deterioration or swelling.

NOTE:
All rubber protective equipment should be stored in a relaxed position, that is, without distortion and mechanical stress. Don't use tape to secure blankets, line hose, hoods, or covers for shipping or storage because the adhesive on the tape may cause chemical deterioration.

Review Questions
for
Rubber Protective Equipment

Question	Answer
1. Which type of manufactured rubber protective equipment is subject to ozone and corona deterioration?	a. Type I, Natural or polyisoprene b. Type II, Elastomeric compound c. Type III, Polypropylene compound d. a and b
2. How often must rubber gloves be field air-tested?	a. Before each use. b. Daily c. Weekly d. Monthly
3. How deep must a cut be in order to have a rubber hood removed from service?	a. 1/2 the thickness of the rubber b. 1/3 the thickness of the rubber c. 1/4 the thickness of the rubber d. 1/5 the thickness of the rubber
4. How often must the electrical supervisor make a visual inspection of rubber goods?	a. Annually b. Monthly c. Quarterly d. Semi-annually
5. Rubber gloves need only be inspected on the outside surface.	a. True b. False
6. What is the shelf life for rubber gloves?	a. Three months b. Six months c. Nine months d. Twelve months
7. How should you locate defects in a blanket?	a. Rolling the blanket twice on each side b. Twisting the blanket in your hands c. Folding the blanket in quarters d. Folding the blanket in half
8. How should rubber blankets be stored?	a. Folded in squares b. Rolled and taped in a blanket tube c. Flat d. Folded diagonally
9. Rubber hoods can be repaired using an approved patch of the same material and dielectric strength as the original.	a. True b. False

RUBBER PROTECTIVE EQUIPMENT

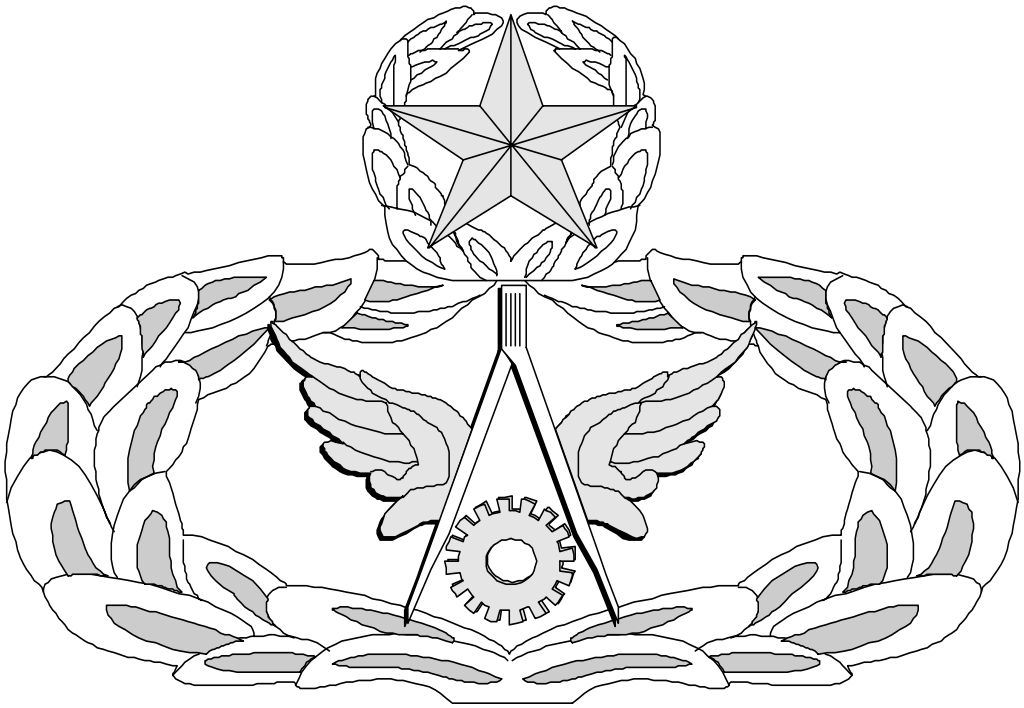
Performance Checklist		
Step	**Yes**	**No**
1. Did the trainee perform an air test on rubber gloves?		
2. Did trainee perform a roll test on rubber sleeves and blankets?		
3. Did the trainee inspect inside and outside of rubber gloves?		
4. Did the trainee perform a thorough visual inspection of line hoses and hoods?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

Air Force Civil Engineer

QUALIFICATION TRAINING PACKAGE (QTP)

REVIEW ANSWER KEY



For

ELECTRICAL SYSTEMS

(3E0X1)

MODULE 9

AIR FORCE OCCUPATIONAL SAFETY AND HEALTH (AFOSH) PROGRAM

Notice. This AFQTP is *NOT* intended to replace the applicable technical references nor is it intended to replace hands-on training. It is to be used in conjunction with these for training purposes only.

INTERPRET AF FORM 269 WHEN PERFORMING SWITCHING

(3E0X1-9.6.3.)

Question	Answer
1. Who is responsible for initiating Safe Clearance Procedures?	d. Base Civil Engineering Operations Chief
2. AF Form 269 Electrical Facilities Safe Clearance must be used when working on any electrical equipment.	b. False
3. Who signs the "Released By" block?	b. Electrical Supervisor
4. Who performs the actual switching?	c. Person receiving clearance
5. To re-energize, perform details of blocking and tagging in reverse order.	a. True
6. The AF Form 269 is a general outline used to accomplish high voltage switching	b. False The AF Form 269 is a detailed outline of switching procedures
7. What time(s) are written on AF Form 269?	f. a,b,& c

PLAN AND INTERPRET SAFE CLEARANCE

(3E0X1-9.6.4.)

Question	Answer
1. What is the first step in planning an outage?	a. Determine area affected
2. Who may issue a safe clearance?	d. a & c
3. Who is responsible for the release of all safe clearances?	d. Safe clearance manager.
4. A visible line break must be present for work to be done under a safe clearance.	a. True, unless underground system has an oil disconnect switch or subway switch that can be locked open
5. What time is written on an AF Form 269?	c. Time Applied
6. The responsibility of reversing the switching procedures belongs to the Chief of Operations.	b. False it is the responsibility of the electrical supervisor

OVER 600 VOLTS

(3E0X1-9.11.1.1.)

Question	Answer
1. On what form do you list the specific steps of an outage?	b. AF Form 269
2. What is the purpose of a "tailgate briefing"?	c. Review work assignments
3. You should do a material check to make sure the planner really knows what he's doing.	b. False, material check is to make sure that you have the correct type and amount of material
4. Why should you overestimate the outage time?	b. To cover unforeseen problems

UNDER 600 VOLTS

(3E0X1-9.11.1.2.)

Question	Answer
1. What is the purpose of a "tailgate briefing"	c. Review work assignments
2. You should do a material check to make sure the planner really knows what he's doing.	b. False, material check is to make sure that you have the correct type and amount of material.
3. Why should you overestimate the outage time?	b. To cover unforeseen problems
4. What is the purpose of lockout-tagout procedures?	a. b and c; Prevent accidental energizing of line and/ or Protection of personnel

OVER 600 VOLTS

(3E0X1-9.11.2.1.)

Question	Answer
1. Work on energized lines and equipment is authorized by _____.	d. Any of the above
2. Live line switching or routine electrical measurements are approved for one person provided he cannot contact energized parts.	a. True
3. All live line work must be performed under the direct supervision of the foreman or work leader.	a. True
4. A tailgate safety briefing is not required when all workers are qualified for the voltage level being worked.	b. False

UNDER 600 VOLTS

(3E0X1-9.11.2.2.)

Question	Answer
1. Two qualified electricians are necessary for any work on a 277/480-vac circuit.	b. False
2. Authorization from the Operations Flight Commander is required for work on low voltage systems.	b. False
3. According to AFI 32-1064 a safety observer must be present for voltages over ____volts.	c. 300 vac
4. Safety briefings are not required on voltages below 300 volts.	b. False

HOTLINE TOOLS

(3E0X1-9.12.1.)

Question	Answer
1. What is the purpose of using hot-line tools?	a. Minimize power outages
2. How often does the supervisor inspect hot-line tools visually?	c. Semi-annually
3. Silicone cloths should be used to maintain the finish on fiberglass hot-sticks.	b. False
4. Hotline tools used for mobility are electrically tested at intervals not to exceed _____.	d. 12 months.
5. What is the minimum acceptance voltage for fiberglass sticks?	d. 100kv AC for 5 minutes
6. You may use household detergent to clean hot-sticks under field conditions.	b. False

RUBBER PROTECTIVE EQUIPMENT

(3E0X1-9.12.2.)

Question	Answer
1. Which type of manufactured rubber protective equipment is subject to ozone and corona deterioration?	a. Type I, Natural or polyisoprene
2. How often must rubber gloves be field air-tested?	a. Before each use.
3. How deep must a cut be in order to have a rubber hood removed from service?	c. 1/4 the thickness of the rubber
4. How often must the electrical supervisor make a visual inspection of rubber goods?	d. Semi-annually
5. Rubber gloves need only be inspected on the outside surface.	b. False
6. What is the shelf life for rubber gloves?	c. Nine months
7. How should you locate defects in a blanket?	a. Rolling the blanket twice on each side
8. How should rubber blankets be stored?	c. Flat.
9. Rubber hoods can be repaired using an approved patch of the same material and dielectric strength as the original.	b. False